Temperament and Character Dimensions of Personality in Patients with Chronic Pain Disorders

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ABSTRACT:

Temperament and character dimensions of personality in patients with chronic pain disorders

Objective: It is known that a complex relationship is present between chronic pain and personality. In this study, we aimed to compare the clinical features and personality traits of patients with Chronic Pain Disorder (CPD) and healthy controls. We hypothesized that Harm Avoidance (HA) scores would be higher and predictive of compared to healthy controls.

Methods: This study was conducted in outpatients with CPD who presented to the Bagcilar Training and Research Hospital's Outpatient Psychiatry Clinic. The sample was comprised of 60 outpatients (53 women, 7 men) who complained of chronic pain for at least 3 months and were not under any medication treatments. The control group comprised of 60 healthy controls (49 women, 11 men). Semi-structured sociodemographic data form, Visual Analog Scale (VAS), Temperament and Character Inventory (TCI), Beck Depression Inventory (BDI), and the Beck Anxiety Inventory (BAI) were administered to the participants. All statistical analyses were performed using SPSS for Windows, Version 23.0.

Results: Impulsiveness subscale of Novelty Seeking; Harm Avoidance and its subscales of Anticipatory worry, Fear of uncertainty, Shyness with strangers, and Fatigability and asthenia scores were significantly higher in CPD patients compared to the control group. Harm Avoidance and its subscales of Anticipatory worry, Fear of uncertainty, Shyness with strangers, and Fatigability and asthenia scores were significantly positively correlated with the BDI, BAI, and VAS scores. When VAS scores were entered as the dependent variable and age and gender were controlled in regression analysis, Harm Avoidance was significantly predictive of VAS scores.

Conclusion: Temperament and character traits of the CPD patients were significantly different from the healthy control subjects. HA scores were higher and predictive of CPD compared to healthy controls.

Keywords: chronic pain, personality, temperament and character inventory (TCI)

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INTRODUCTION

Pain is ubiquitously seen in many clinical disorders such as acute pain in traumas and following surgical operations, and chronic pain such as seen in cancer, rheumatological disorders like arthritis, endocrine disorders such as diabetes mellitus, immune deficiency syndromes such as AIDS, and as a result of nutritional deficiencies (1). Pervasiveness of poorly assessed, poorly treated chronic pain interferes with multiple aspects of the individual's life and has many consequences including its effects on daily activities, productivity, and quality of life, its link with suicide, its financial costs turning this into a very large public health problem. Evidence also suggests that the quality of healthcare and access to assessment and treatment of pain are poorer for racial and ethnic minorities (2).

Chronic pain is pain that persists over time (6 months or longer) and typically results from long-standing conditions or damage to the body and emotional, sensitive, cognitive, and behavioral components (3,4). The etiology of chronic pain is still largely unknown. However, a growing body of evidence suggests a complex relationship between chronic pain and personality characteristics (5,6). It is well documented that chronic pain patients suffer from a

number of co-morbid psychiatric conditions including depression, anxiety disorders, substance use disorders, and personality disorders and the incidence of these disorders is signiŞcantly greater in the chronic pain patients than in the general population (7). Since chronic pain has biological and psychosocial factors; biological, psychological, and social factors and their complex interactions should have been considered in its management. Although patients often have unrealistic expectations for total resolution of pain, maximal resolution of pain and associated problems and resuming baseline physical functionality should be aimed in chronic pain patients during treatment planning and predicting treatment outcome (1).

In his psychobiological model of personality, Cloninger developed a pioneering approach concerning the relationships between development of personality and psychiatric disorders (8,9). Cloninger's model consists of four temperament and three character dimensions, all of which are viewed as being the results of continuous interactions during the lifespan (8, 9). Temperament refers to automatic emotional responses to experiences and is largely heritable and stable throughout life while character dimensions represent differences in goals, values, attitudes, and self-concept and is moderately influenced by social learning and maturation (8,9). Four dimensions of temperament are Novelty Seeking (NS), Harm Avoidance (HA), Reward Dependence (RD), and Persistence (P). Novelty Seeking refers to a heritable bias in the activation and initiation of behavior in response to novelty. Harm Avoidance indicates a heritable bias for inhibition and cessation of behaviors in anticipation of distress. Reward Dependence refers to a heritable bias for maintenance of ongoing behavior in response to social reward cues. Persistence refers to perseverance despite frustration and fatigue in response to signals of anticipated reward versus laziness and underachieving (8,9). Character dimensions involve individual differences in higher cognitive processes. Character regulates the cognitive processes of sensory perception and emotion activated by temperament, leading to the development of a mature concept of the self in the personal, social, and spiritual arenas. Self-Directedness (SD) refers to the ability of an individual to control, regulate, and adapt his/ her behavior to fit the situation in accordance with one's goals and values. Cooperativeness (C) refers to individual differences with respect to tolerance and empathy and indicates the extent to which individuals

view others as a part of the self. Self-Transcendence (ST) refers to differences in spirituality identification with a unity of all things in the world (8,9).

Although it is evident that chronic pain is associated with a particular personality proŞle, the studies did not explicitly reveal whether certain personality characteristics, in other words "pain personality", are associated with chronic pain. The current TCI literature revealed a common personality profile of chronic pain patients characterized the combination of higher Harm Avoidance and lower Self-Directedness which has been shown to be the most distinguishable personality characteristic of patients with chronic pain (10-13).

In this study, we aimed to examine clinical features and personality traits in patients diagnosed with Chronic Pain Disorder (CPD) compared to the healthy controls. Our study hypothesis was that the temperament and character traits of the patients with CPD would be different from the healthy controls. We hypothesized that HA scores would be higher and SD scores would be lower and also predictive of CPD compared to healthy controls. In other words, we predict that it would be more common for an individual to express high levels of harm avoidance and low levels of SD in the presence of CPD compared to healthy controls.

METHODS

Study Participants

Sixty CPD outpatients (53 women, 7 men) with a mean age of 40.87 years (SD±10.53 years) who complained of pain at least 3 months and were not under treatment and 60 healthy controls (49 women, 11 men), with a mean age of 38.83 years (SD±9.41) were recruited for the study at the Psychiatric Unit of Bagcilar Training and Research Hospital, Istanbul, Turkey. Both study groups had no history of any psychotic disorders and were free of any medical illnesses and neurological diseases. The study protocol was approved by the Ethics Committee of our hospital, and all study participants provided written informed consents following the study has been thoroughly explained to them.

Psychometric Measurements

Sociodemographic Data Form. This form includes demographic variables including gender, age, marital

status, the number of children, education, location, household members, occupation, employment status, the number of siblings, family history of chronic disease, other known physical illnesses, and previous psychiatric treatments.

Visual Analog Scale (VAS). Chronic Pain Disorder severity was evaluated with VAS; a self-report scale that is a unidimensional measure of pain intensity. The pain VAS is a continuous scale comprised of a horizontal (HVAS) or vertical (VVAS) line, usually 10 centimeters (100 mm) in length, anchored by two verbal descriptors, one for each symptom extreme (14,15). Instructions, the time period for reporting, and verbal descriptor anchors have varied widely in the literature depending on intended use of the scale (16). For pain intensity, the scale is most commonly anchored by "no pain" (score of 0) and "pain as bad as it could be" or "worst imaginable pain" (score of 100) (15,17). To avoid clustering of scores around a preferred numeric value, numbers or verbal descriptors at intermediate points are not recommended (18,19). Varies, but most commonly respondents are asked to report "current" pain intensity or pain intensity "in the last 24 hours."

Turkish TCI. Temperament and Character Inventory (TCI) is a self-administered, 240-item true/false questionnaire. The CPD patients completed a Turkish version of the 240-item self-questionnaire (Turkish-TCI) at the end of the psychiatric interview, and the control group received the instruction to complete the questionnaire at home. The TCI is a 240-item self-administered questionnaire that measures the four temperament dimensions (NS, HA, RD, and P) and the three character dimensions (SD, C, and ST) (8). The Turkish-TCI has been validated by Kose et al. (20,21). Two staff psychiatrists performed all diagnostic assessments and clinical ratings.

Beck Depression Inventory (BDI). Beck Depression Inventory (BDI) is a self-report scale composed of 21 items and measures somatic, emotional, cognitive, and impulsive symptoms of depression (22). Each item takes a point between 0 and 3. The point that can be taken from inventory varies between 0 and 63, and high points indicate a rise in the depressive mood. The scale aims not to diagnosis but converts the symptoms level to the objective number (23). Overall scores for all questions is evaluated like this: a score

between 10-16 shows low depression symptom, a score between 17-29 is a middle depressive symptom, and a score between 30-63 is a severe depressive symptom. BDI has been adapted into Turkish, and Hisli (24) has examined the reliability and validity of the scale.

Beck Anxiety Inventory (BAI). The BAI is a 21-item self-report questionnaire that lists symptoms of anxiety. The respondent is asked to rate how much each symptom has bothered him/her in the past week. The symptoms are rated on a four-point scale, ranging from "not at all" (0) to "severely" (3). The instrument has excellent internal consistency of Cronbach's alpha=0.92) and high test–retest reliability (r =0.75) (25).

Statistical Analysis

All statistical analyses were performed using SPSS for Windows, Version 23.0. The variables in the present study were examined with the Kolmogorov-Smirnov's test of normality. All variables were normally distributed. An independent sample t-test was used for comparisons between the patient and the control groups. Within-group correlations between TCI scores were performed using the Pearson's correlation coefficient. Hierarchical Multiple Regression analysis was performed to examine the association between the VAS Scale scores and TCI's temperament and character dimensions. A p value less than 0.05 was considered statistically significant.

RESULTS

Sociodemographic Characteristics of Sample

The mean age of the study participants was 37.85±10.644 years (X±SD); 20.8% (n=25) of participants were male; 79.2% (n=79.2) were female. 71.1% of the participants in the study were married, and 21.7% of participants were single, 6 (5.0%) were divorced, 1 (0.8%) was widowed, and one participant (0.8%) was separated. 40 participants (33.3%) were graduated from elementary school, 19 (15.8%) from high school, 48 (40.0%) from college and 7 (5.8%) participants were graduated from middle school. 27.5% participants in the study were a housekeeper, government employees (26.7%) and worker (21.7%). The remaining participants were unemployed (7.5%), retired

(7.5%), student (1.7%), freelancer (3.3%), and other professions (4.2%). Among the participants in the study, 29 (24.2%) had psychiatric family history [generalized anxiety disorder (n=1), panic disorder (n=4), major depressive disorder (n=18), bipolar disorder (n=2), and schizophrenia (n=3)]. 36.7% of participants in the sample were smoking cigarettes, and 19.2% of participants were alcohol user. 30.0% participants had alcohol use history in the past. 7.5% of participants attempted to suicide. Sociodemographic characteristics of participants were presented in Table 1.

Table 1: Sociodemographic characteristics of the sample		
	n	**%**
Gender		
Female	95	79.2
Male	25	20.8
Marital status		
Married	86	71.7
Single	26	21.7
Divorced	6	5.0
Widowed	1	0.8
Separated	1	0.8
Education		
Elementary School	40	33.3
Middle School	7	5.8
High School	19	15.8
College	48	40.0
Other	6	5.1
Profession		
Unemployed	9	7.5
Worker	26	21.7
Government Employee	32	26.7
Housekeeper	33	27.5
Other	20	16.6
Psychiatric Family History		
Present	29	24.2
Absent	91	75.8
Psychiatric Illness in Family		
None	92	77.6
GAD	1	0.8
Panic Disorder	4	3.3
MDD	18	15.0
Bipolar Disorder	2	1.7
Schizophrenia	3	2.5
Nicotine Use		
Present	44	36.7
Absent	76	63.3
Alcohol Use		
Present	23	19.2
Absent	97	80.8
Suicide Attempt		
Present	9	7.5
Absent	111	92.5

Comparing TCI scales and subscales between CPD patients and controls

An independent-samples t-test was conducted to compare TCI scales and subscales scores for OCD patient and control groups. The results revealed that there was a statistically significant difference between the patients and controls in terms of Impulsiveness subscale scores of Novelty Seeking (t(118)=3.120, p=0.002); Harm Avoidance (t(118)=8.204, p=0.000) and its subscales of Anticipatory worry (t(118)=11.840, p=0.000), Fear of uncertainty (t118)=5.987, p=0.000), Shyness with strangers (t(118)=6.493 p=0.000), and Fatigability and asthenia (t(118)=5.950, p=0.000), Exploratory Excitability (t(118)=-2.179, p=0.031); Reward Dependence (t(118)=-2.188, p=0.031) and its subscale of Attachment (t(118)=-2.531, p=0.013); Persistence (t(118)=-2.698, p=0.008); Self-Directedness (t(118)=-6218, p=0.000) and its subscales of Responsibility (t(118)=-6.334, p=0.000), Purposefulness (t(118)=-5.170, p=0.000), Resourcefulness (t(118)=-5.217, p=0.000), and Congruent Second Nature (t(118)=-6.218, p=0.000); Social Acceptance subscale of Cooperativeness (t(118)=-4.514, p=0.000). Impulsiveness subscale of Novelty Seeking ($\bar{X}_{patient}$=4.22, SD$_{Patient}$=1.914; $\bar{X}_{Control}$=3.20, SD$_{Control}$=1.645); Harm Avoidance ($\bar{X}_{patient}$=21.23, SD$_{Patient}$=6.285; $\bar{X}_{Control}$=11.92, SD$_{Control}$=6.154) and its subscales of Anticipatory worry ($\bar{X}_{patient}$= 6.62, SD$_{Patient}$=2.630; $\bar{X}_{Control}$=3.78, SD$_{Control}$=2.233), Fear of uncertainty ($\bar{X}_{patient}$=5.12, SD$_{Patient}$=1.563; $\bar{X}_{Control}$=3.18, SD$_{Control}$=1.953), Shyness with strangers ($\bar{X}_{patient}$=4.27, SD$_{Patient}$=2.154; $\bar{X}_{Control}$=1.950, SD$_{Control}$=1.731), and Fatigability and asthenia ($\bar{X}_{patient}$=5.23, SD$_{Patient}$=2.118; $\bar{X}_{Control}$=3.00, SD$_{Control}$=1.992) were significantly higher in CPD patients compared to the control group. On the other hand, Exploratory Excitability ($\bar{X}_{patient}$=5.30, SD$_{Patient}$=2.094; $\bar{X}_{Control}$=6.130, SD$_{Patient}$=2.095); Reward Dependence ($\bar{X}_{patient}$=13.780, SD$_{Patient}$=3.076; $\bar{X}_{Control}$=15.070, SD$_{Control}$=3.344) and its subscale of Attachment ($\bar{X}_{patient}$=4.25, SD$_{Patient}$=2.005; $\bar{X}_{Control}$=5.080, SD$_{Control}$=1.576); Persistence ($\bar{X}_{patient}$=4.830, SD$_{Patient}$=1.897; $\bar{X}_{Control}$=5.680, SD$_{Control}$=1.535); Self-Directedness ($\bar{X}_{patient}$=25.068, SD$_{Patient}$=6.678; $\bar{X}_{Control}$=31.980, SD$_{Control}$=4.123) and its subscales of Responsibility ($\bar{X}_{patient}$=4.07, SD$_{Patient}$=2.208; $\bar{X}_{Control}$=6.32, SD$_{Control}$=1.642), Purposefulness ($\bar{X}_{patient}$= 4.830, SD$_{Patient}$=1.729; $\bar{X}_{Control}$=6.30, SD$_{Control}$=1.357), Resourcefulness ($\bar{X}_{patient}$=2.82, SD$_{Patient}$=1.384; $\bar{X}_{Control}$=4.05, SD$_{Control}$=1.199), and Congruent Second Nature ($\bar{X}$

patient=8.420, SD$_{Patient}$=2.011; $\overline{X}_{Control}$ =9.35, SD$_{Control}$ =1.665); Social Acceptance subscale of Cooperativeness ($\overline{X}_{patient}$=5.45, SD$_{Patient}$ =2.037; $\overline{X}_{Control}$=6.850, SD$_{Control}$=1.273) scores were significantly lower in CPD patients compared to the controls. The results of TCI scales and subscales differences between CPD patients and controls are presented in Table 2.

Correlation of TCI Scales and Subscales with Other Scales Scores

There were statistically significant and strong positive correlations between Harm Avoidance scale and its subscales with BDI, BAI, and VAS scores. Harm Avoidance was statistically significantly and positively correlated with BDI (r=0.684, p<0.01), BAI (r=0.582, p<0.01), and VAS (r=0.538, p<0.01) scores. Anticipatory worry was positively and statistically significantly correlated with BDI (r=0.694,

p<0.01), BAI (r=0.552, p<0.01), and VAS (r=0.460, p<0.01). Fear of uncertainty subscale of Harm Avoidance was positively and statistically significantly correlated with BDI (r=0.437, p<0.01), BAI (r=0.383, p<0.01), and VAS (r=0.368, p<0.01) scores. Shyness with strangers subscale of Harm Avoidance was positively and statistically significantly correlated with BDI (r=0.509, p<0.01), BAI (r=0.370, p<0.01), and VAS (r=0.454, p<0.01) scores. Similarly, Fatigability and asthenia scores subscale was positively and statistically significantly correlated with BDI (r=0.568, p<0.01), BAI (r=0.580, p<0.01), and VAS (r=0.475, p<0.01) scores.

On the other hand, there were statistically significant and strong negative correlations between Self-Directedness scale and all of its subscales except for Self-acceptance and the BDI, BAI, and VAS scores. Self-Directedness scale was statistically significantly and negatively correlated with BDI (r=-0.661, p<0.01), BAI (r=-0.581, p<0.01), and VAS (r=-0.438, p<0.01). Responsibility subscale was statistically

Table 2: Comparison of TCI Scales and Subscales between CPD Patients and Healthy Controls							
	Group	n	$\overline{X}$	SD	t	df	p
Impulsiveness	CPD	60	4.22	1.914	3.120	118	0.002
	Healthy	60	3.20	1.645			
Exploratory Excitability	CPD	60	5.30	2.094	-2.179	118	0.031
	Healthy	60	6.13	2.095			
HARM AVOIDANCE	CPD	60	21.23	6.285	8.204	118	0.000
	Healthy	60	11.92	6.154			
Anticipatory Worry	CPD	60	6.62	2.630	6.361	118	0.000
	Healthy	60	3.78	2.233			
Fear of Uncertainty	CPD	60	5.12	1.563	5.987	118	0.000
	Healthy	60	3.18	1.953			
Shyness	CPD	60	4.27	2.154	6.493	118	0.000
	Healthy	60	1.95	1.731			
Fatigability	CPD	60	5.23	2.118	5.950	118	0.000
	Healthy	60	3.00	1.992			
REWARD DEPENDENCE	CPD	60	13.78	3.076	-2.188	118	0.031
	Healthy	60	15.07	3.344			
Attachment	CPD	60	4.25	2.005	-2.531	118	0.013
	Healthy	60	5.08	1.576			
PERSISTANCE	CPD	60	4.83	1.897	-2.698	118	0.008
	Healthy	60	5.68	1.535			
SELF-DIRECTEDNESS	CPD	60	25.68	6.678	-6.218	118	0.000
	Healthy	60	31.98	4.123			
Responsibility	CPD	60	4.07	2.208	-6.334	118	0.000
	Healthy	60	6.32	1.642			
Purposefulness	CPD	60	4.83	1.729	-5.170	118	0.000
	Healthy	60	6.30	1.357			
Resourcefulness	CPD	60	2.82	1.384	-5.217	118	0.000
	Healthy	60	4.05	1.199			
Congruent Second Nature	CPD	60	8.42	2.011	-2.769	118	0.007
	Healthy	60	9.35	1.665			
Social Acceptance	CPD	60	5.45	2.037	-1.788	118	0.076
	Healthy	60	6.85	1.273			

Table 3: Correlations between TCI and Other Scale Scores

	BDI	BAI	VAS
HARM AVOIDANCE	0.684**	0.582**	0.538**
Anticipatory Worry	0.694**	0.552**	0.460**
Fear of Uncertainty	0.437**	0.383**	0.368**
Shyness	0.509**	0.370**	0.454**
Fatigability	0.568**	0.580**	0.475**
SELF-DIRECTEDNESS	-0.661**	-0.581**	-0.436**
Responsibility	-0.625**	-0.605**	-0.450**
Purposefulness	-0.600**	-0.519**	-0.418**
Resourcefulness	-0.465**	-0.383**	-0.320**
Congruent Second Nature	-0.414**	-0.350**	-0.258**

**Correlation is significant at the 0.01 level (2-tailed).

Table 4: Hierarchical Multiple Regression

Model 1	B	SE	β
(Constant)	2.680	1.638	
Age	0.086	0.031	0.241
Gender	-2.031	0.811	-0.219
Model 2			
(Constant)	1.612	3.775	
Age	0.069	0.030	0.195
Gender	-0.774	0.744	-0.083
NOVELTY SEEKING	0.062	0.061	0.087
HARM AVOIDANCE	0.173	0.051	0.354**
REWARD DEPENDENCE	-0.131	0.099	-0.113
PERSISTENCE	-0.274	0.181	-0.128
SELF-DIRECTEDNESS	-0.118	0.064	-0.199
COOPERATIVENESS	0.074	0.068	0.104
SELF-TRANSCENDENCE	0.044	0.059	0.065
R^2		0.390	
F		7.821**	
p<0.01			

Dependent variable: Visual Analog Scale (VAS) Scale

significantly and negatively correlated with BDI (r=-0.625, p<0.01), BAI (r=-0.605, p<0.01), and VAS (r=-0.450, p<0.01) scores. Purposefulness subscale of Self-Directedness was statistically significantly and negatively correlated with BDI (r=-0.600, p<0.01), BAI (r=-0.519, p<0.01), and VAS (r=-0.418, p<0.01). Resourcefulness subscale was statistically significantly and negatively correlated with BDI (r=-0.465, p<0.01), BAI (r=-0.383, p<0.01), and VAS (r=-0.320, p<0.01). Congruent Second Nature subscale of Self-Directedness was statistically significantly and negatively correlated with BDI (r=-0.414, p<0.01), BAI (r=-0.350, p<0.01), and VAS (r=-0.258, p<0.01). The results of Pearson's Correlation between TCI scales and subscales and BDI, BAI, and VAS scores are presented in Table 3.

The Predictors of VAS Scores

The hypothesized relationship between VAS scores and TCI scales were tested in two separate hierarchical multiple regression. The demographic variables (age, gender) were entered in the first step of the hierarchical multiple regression. TCI scales were entered in the second steps of the hierarchical regression analyses. The results indicated that Harm Avoidance was significantly predictive of VAS scores (R^2=0.390, F (9,110)=7.821, p=0.00). The results of the hierarchical multiple regression are presented in Table 4.

DISCUSSION

Our study results emphasized the importance of high HA and lower RD, P and SD scores in CPD patients compared to healthy controls. These results are consistent with some previous reports linking high HA, low SD, and low RD in patients with CPD (10-13). However, the relationship between personality and CPD seems to be much more complex. Personality features may not only predispose an individual to the onset of chronic pain, but may also affect the expression and duration of pain or a separate process is responsible for both personality factors and chronic pain.

There were no statistically significant differences regarding female-male distribution in both control and patient groups in our study, the patient group was predominantly composed of women (n=53, 88.3% vs. n=7, 11.7%). Keogh et al. reported that women were complaining from pain more throughout their lifetime in more areas of their body and for longer durations compared to men (26). Keogh and his collaborators interviewed patients in a pain management program and although the program reduced

chronic pain for all the subjects, in follow up exams the women reported pain levels as high as before the treatment while the improvements in the male group were longer lasting (26). A higher rate of women in our study sample may be due to cultural reasons. The fact that women focus on the emotional response to stress and men typically think only of the sensation itself might explain why women actually experience more pain as a result, possibly due to the negative emotions associated with pain and this differential responsiveness would be widened in societies where women express their emotions through somatic pains. In terms of gender differences; Exploratory Excitability and Extravagance subscale of Novelty Seeking and Anticipatory Worry subscale of Harm Avoidance and Attachment subscale and total Reward Dependence scores were statistically significantly lower in female patients compared to male patients (p=0.013, p=0.039, p=0.030, p=0.013, p=0.040, respectively).

In clinical practice, assessing temperament may help to understand the individual's experience of pain and the related pain behavior. Harm Avoidance (HA) is a temperamental trait referring to a heritable tendency characterized by inhibition of behavior in response to disruptive, non-rewarding, and punitive signals. Individuals high in Harm Avoidance are described as cautious, careful, fearful, tense, apprehensive, nervous, timid, doubtful, discouraged, insecure, passive, negative, or pessimistic even in situations which would not worry other people, all of which are often clinically observed in chronic pain sufferers and are similar to the concept of fear-avoidance. They are inclined to inhibit their behavior in relation to harmful stimuli and react to stressful events such as ongoing pain with high levels in state depression and/or state anxiety (8,10). Harm avoidance is associated with the serotonergic activity, and individuals with high HA respond to stressful situations with fear and avoidance due to catastrophic interpretations (27,28). Although depression seems to reduce level of harm avoidance and cooperation, it has been shown that TCI is not affected by the situational influence of depression in mild to moderate depression, and these results are interpreted as suggesting that TCI is a suitable tool to demonstrate underlying personality in mild to moderately depressed patients (29). It has been emphasized that comorbid depression usually augment the HA scores further and is associated with anxiety (30,31). In this present study, CPD patients had significantly higher HA scores than healthy controls.

In examining the relationship between anxiety and impulsivity, higher Novelty Seeking scores were associated with impulsivity, particularly when considered together with low SD and RD scores (32,33). In this present study; Impulsiveness subscale of NS scores of CPD patients were found statistically significantly higher and Exploratory excitability subscale of NS scores was statistically significantly lower than healthy controls. This finding is consistent with the literature. The low scores in the NS dimension were interpreted as the fact that patients with chronic pain were represented by impulsivity, excessive anger and quick disengagement whenever their wishes are frustrated, which leads to inconsistencies in relationships and instability in efforts and they avoid the pain experience. It has been suggested that in the group of patients without a migraine, a high score in the HA dimension and a low score in the NS dimension may be associated with Cluster C personality disorders (32). Reward Dependence scores were found statistically significantly lower in CPD patients compared to the healthy controls. This finding is consistent with the literature (33). The fact that low Reward Dependence is correlated with Cluster A symptoms, especially the paranoid and schizoid symptoms (11), the relationship between low Reward Dependence and the Odd-Eccentric Cluster supports the theory that these patients have diffculties with social attachment. Persistence scores were found statistically significantly lower in CPD patients compared to the healthy controls. This finding is consistent with the literature (10,35) and notion that CPD patients lack perseverance despite frustration and fatigue, and this might underline their maladaptive coping skills.

In line with our study hypotheses, Self-Directedness scores were found statistically significantly lower in CPD patients compared to the healthy controls. Low scores in Self-Directedness reşects an individual's tendency to blame other people and external circumstances for what is happening to them, their struggle to şnd direction, purpose, and meaning in their lives, and generally, they seem to be lacking an internal locus of control, which renders them to deŞne, set and pursue meaningful goals and overcome obstacles in aversive situations. They are described as weak, fragile, blaming, destructive, ineffective, irresponsible, and unreliable. Notably, low levels in Self-Directedness are a major predictor of personality disorders (8,9,34) and low scores in Self-Directedness together with high Harm

Avoidance levels characterize a Cluster C personality disorders (avoidant, obsessive–compulsive, dependent, and passive–aggressive) (11,34). In terms of Cooperativeness scores, only Social acceptance subscale scores were found statistically significantly lower in CPD patients compared to the healthy controls.

Another effective stress related condition to the pain is depression. Depression was observed to be highly comorbid in CPD patients, and especially somatic depression is more common in women than in men (36).

Harm Avoidance scale and its subscales Anticipatory worry, Fear of uncertainty, Shyness with strangers, and Fatigability and asthenia were found statistically significantly and positively correlated with BDI, BAI, and VAS scores. Self-Directedness scale and all of its subscales except for Self-acceptance were statistically significantly negatively correlated with BDI, BAI, and VAS scores. In another study conducted in Turkey, HA scores were found to be positively correlated with BDI and BAI scores and SD scores were found to be negatively correlated with BDI scores, and no correlations were found between the TCI scales and VAS pain scores in patients with fibromyalgia (13).

The hypothesized relationship between VAS pain scores and TCI scales were tested in hierarchical multiple regression. When demographic variables such as age and gender were controlled Harm Avoidance scores were significantly predictive of VAS pain scores (on average 39%. Our findins support the notion that TCI can be instrumental in both clinical and research purposes while evaluating CPD patients and can be a predictor of the pain disorders and its symptoms.

The present study has certain limitations. First, it should be noted that the study was carried out with a relatively small sample due to our hospital's outpatient clinics inherent limitations. We did not exclude patients who had comorbid personality disorders. Second, temperament and character traits can also be affected by presence of personality disorders. Therefore, the conclusions should not be considered definitive and further studies should be conducted in larger patient samples. Despite these limitations, our findings, especially predictive value of temperament and character dimensions for chronic pain disorder would help shaping future discussions concerning the degree to which temperamental traits are necessary or sufficient conditions for pain disorder psychopathology.

In conclusion, our data suggest that enhanced understanding of temperament–psychopathology relations will have important implications for both assessment and prevention of significant psychiatric symptoms in patients with chronic pain disorder.

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